Option —08
Isolator

608-1. INTRODUCTION

608-2. When an i/o interface (Options –05, –06, or –07) is installed, the Isolator must be installed to maintain the guarded nature of the analog bus. The module serially isolates the analog signal processing and conversion from the digital processing, control display, and input/output. The maximum allowable difference in potential between guard and logic common is 1000 volts.

608-3. INSTALLATION

608-4. Refer to Section 4 of this manual under Module Installation and Removal for instructions on installing a module. The isolator should replace the Interconnect pcb. The interconnect diagram in Section 8 contains a table showing the location of the slot.

608-5. OPERATING NOTES

608-6. Installation of the Isolator does not affect the operation of the instrument.

608-7. THEORY OF OPERATION

608-8. The Isolator accepts parallel data and address bytes, shifts them to serial format for transfer across isolation transformers, and converts them back to parallel format. Seven address lines are used for addressing analog modules with two lines (IC5 and 6) always low. Only one analog module sends data back to the controller: the A/D Converter uses ID7 to form its bit serial data stream. When the Isolator is installed V_{CC} and V_{SS} in the unguarded bus are isolated from analog common. Refer to the schematic, Figure 608-3, for the following discussion.

608-9. Two types of addresses may be sent from the controller to an analog module: a 3-of-7 address accompanied by data used to set up a module or a 2-of-7 indirect address sent to the A/D Converter to obtain a data bit. Address lines IC0-4 are applied through inverters to shift registers U3 and U7. Module set-up addresses must have one of IC0, 3, or 4 high, which places a low at one input of U10-6. U6-2 goes low, inhibiting U9-11 and enabling U10-8 to go high. All analog module addresses are formed with ones on IC0-4 so IC5 and 6 will be low. U12-11 and U12-3 go high enabling U10-12 to go low. The low going signal from U10-12 clocks a one-shot, U8-4. The consequent low from U8-4 loads data on ID0-7 and the address into U3 and U7. The low from U8-4 also disables a relaxation oscillator, U9-6 and U9-3, which runs at approximately 7.5 MHz. At the end of the load time determined by R2 and C2, U8-4 goes high which enables the oscillator.

608-10. Oscillator pulses from U11-4 and U11-10 clock data serially out of U7 and U3 (from U3-9), through U4 and the isolation transformers (T1, T2, T3, T4) and into U20 and U16. Note that one data input to U3-5 is V_{CC}, which ensures that data bit is high. As data is clocked serially into U20 and U16, U16-11 goes high when data loading is complete. This puts a high on U19-12, disabling the clock pulses from U24-4, and a high on U23-10, clocking U23-12 low, which enables the address gates, U22 and U26-4. Data from U20 and U16 is applied through buffers to the ID lines.

608-11. The low from U23-12 also enables U19-1 so that when the ACK is returned, U25-6 goes low and U19-1 goes high. U19-1 high enables a clock pulse from U24-4 and U24-12 to be applied through U15-3, U15-6, T8, and T7 to clock U8-10, resulting in an ACK signal from U8-12 through U5-6 and Q1.

608-12. In the case of indirect address, IC1, 2, U9-11 is no longer disabled. The above sequence of address and data transfer takes place. Of course there is no data to be sent to the A/D Converter; instead the controller is requesting data to be sent on ID7. Outputs from the address gates, U22 and U26-4, are decoded by U25-9 and U18-4 to cause a high at U18-3. This places U21-13 in the high impedance mode and enables U19-4 through U25-10. The data bit

returned on ID7 is applied through U26-3 and U19-4 to enable U15-8 and U15-11. A clock pulse from U24-4 and U24-12 through U15-11, U15-8, T6, and T5 clocks U14-5. This places a high at U13-10 (provided ID7 is high). U13-9 is enabled by U9-11 through U12-10 and U12-4. If ID7 is low, U19-4 does not go high.

608-13. During the load period (a low from U8-4), the clock (U9-3, U9-6) is disabled. Clock pulses from U24-4 are applied to a retriggerable monostable multivibrator, U23-13. When the clock pulses are disabled, U23-13 places a low on U20-9 and U16-9 to clear any previously latched data.

608-14. TROUBLESHOOTING

608-15. Figure 608-1 gives a symptom analysis approach to troubleshooting the Isolator module.

608-16. PARTS LIST

608-17. Table 608-1 gives a parts breakdown for the Isolator module. Refer to Section 5 of this manual for ordering information.

CAUTION ⊗

Indicated devices are subject to damage by static discharge.

Figure 608-1. Isolator Troubleshooting

SYMPTOM	POSSIBLE FAILURE
No Display at Power On	IC line held low U5, U12
Display Bad	IC line held high U5, U12 ID line held high or low U1, U2, U13
UNGUARDED SECTION	
Error 9 at Power On	Oscillator check U11 – 10 Shift Register U13 – 1, U7 Not transferring pulses U4, core windings ACK bad U9, U5, Q1, U6, U7
Option Configuration Wrong	Address lines hung
Can't Call Proper Ranges	Data lines hung U1, U2, U3
Constant Bad Reading Displayed	ID7 not returned U14, U13, core winding U12, U10, U9
GUARDED SECTION	
Error 9 or Configuration Wrong	U19 – 10, U16 – 1, U23 – 13 (Address, Data) U25, U19, U15, U24 (ACK) U24, U23 (Address)
Can't Call Proper Ranges	U16, U21, U18
Constant Bad Reading Displayed	U18, U26, U25, U19, U15 (ID7)

Table 608-1. MIS-4181 Isolator Assembly

REF DESIG OR ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG FED SPLY CDE	MFG PART. NO. OR TYPE	TOT QTY	REC QTY	USE CDE
Ⓧ	**ISOLATOR ASSEMBLY** **Figure: 608-2**	383877	89536	383877	REF		
C1, C4	Cap, mica, 220 pF ±5%, 500V	170423	72136	DM15F220J	2		
C2	Cap, mica, 18 pF ±5%, 500V	266585	72136	DM15C180J	1		
C3	Cap, mica, 180 pF ±5%, 500V	148460	72136	DM15F181J	1		
C5	Cap, mica, 68 pF ±5%, 500V	148510	72136	DM15F680J	1		
C6	Cap, Ta, 39 uF ±20%, 6V	163915	56289	196D396X0006 KA1	1		
C7	Cap, elect, 150 uF −10/+50%, 16V	186296	73445	ET151X016A5	1	1	
C8, C9	Cap, mica, 27 pF ±5%, 500V	177998	72136	DM15E270J	2		
C10, C12, C13	Cap, cer, 0.22 uF ±20%, 50V	309849	71590	CW30C224K	3		
C11	Cap, cer, 4700 pF ±10%, 500V	106724	71590	CF472	1		
Q1	Xstr, Si, PNP	226290	04713	MPS3640	1	1	
R1	Res, comp, 220 ±5%, 1/4W	147959	01121	CB2215	1		
R2, R5, R8 thru R13	Res, comp, 10k ±5%, 1/4W	148106	01121	CB1035	8		
R3	Res, comp, 47k ±5%, 1/4W	148163	01121	CB4735	1		
R4, R7	Res, comp, 4.7k ±5%, 1/4W	148072	01121	CB4725	2		
R6	Res, comp, 1k ±5%, 1/4W	148032	01121	CB1025	1		
R14	Res, comp, 150 ±5%, 1/4W	147934	01121	CB1515	1		
R15	Res, comp, 470 ±5%, 1/4W	147983	01121	CB4715	1		
T1, T3, T6, T8	Inductor	437608	89536	437608	4		
T2, T4, T5, T7	Inductor	437590	89536	437590	4		
U1, U2, U5	Ⓧ IC, Dgtl, C-MOS, hex, buffer/inverter	381830	02735	CD4050AE	3	1	
U3, U7	IC, TTL, MSI, 8-bit shift register	293118	01295	SN74165N	2	1	
U4, U15	IC, Dgtl, TTL, quad, 2-input, hi-vol, NAND	408021	01295	SN7426N	2	1	

Table 608-1. MIS-4181 Isolator Assembly (Concluded)

REF DESIG OR ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG FED SPLY CDE	MFG PART. NO. OR TYPE	TOT QTY	REC QTY	USE CDE
U6, U24	⊗IC, Dgtl, TTL, hex inverter	393058	01295	SN74LS04N	2	1	
U8, U14, U23	⊗IC, Dgtl, TTL, lo-pwr	404186	01295	SN74LS123N	3	1	
U9	⊗IC, Dgtl, TTL, quad 2-input, NAND gate	363580	01295	SN74S00N	1	1	
U10	⊗IC, Dgtl, TTL, triple, input, POS NAND gates	393074	01295	SN74LS10N	1	1	
U11, U19	⊗IC, Dgtl, POS NOR gates, w/totempole output	393041	01295	SN74LS02N	2	1	
U12, U22, U26	⊗IC, Dgtl, COS/MOS, NOR gates	355172	02735	CD4001AE	3	1	
U13, U21	⊗IC, Dgtl, C-MOS, tri-state, hex, non-inverting buffers	407759	12040	MM80C97N	2	1	
U16, U20	IC, TTL, 8-bit serial-in parallel-out, shift register	272138	01295	SN74164N	2	1	
U17	Res Network, 10k, 16 pin	355305	89536	355305	1	1	
U18	⊗IC, Dgtl, C-MOS, quad, 2-input AND gate	408401	02735	CD4081BE	1	1	
U25	⊗IC, C-MOS, NOR gates	355180	02735	CD4025AE	1	1	
	Case half, module	402990	89536	402990	2		
	Cover, module case	402974	89536	402974	1		
	Decal Isolator	413534	89536	413534	1		
	Guard, front, left	437921	89536	437921	1		
	Guard, front, right	401513	89536	401513	1		
	Guard, rear, left	437947	89536	437947	1		
	Guard, rear, right	383349	89536	383349	1		
	Shield, cover	437939	89536	437939	2		

NOTES:
1. FOR ASSY DRAWING SEE M.I.S.-4181.
2. FOR PCB SEE M.I.S.-3181.
3. FOR SCHEMATIC SEE M.I.S.-1181

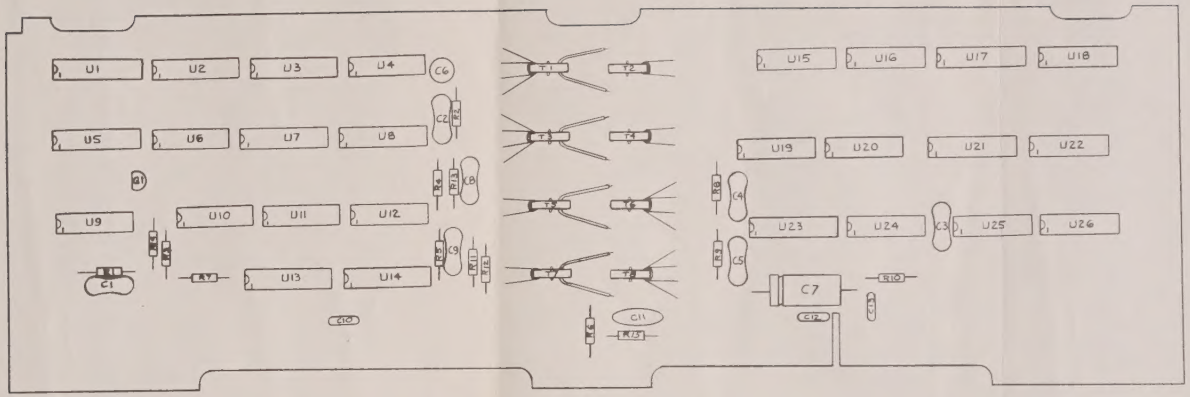

Figure 608-2. Isolator Assembly (M.I.S.-1781)

NOTES:
1. FOR ASSY DRAWING SEE M.I.S.-4181.
2. FOR PCB SEE M.I.S.-3181.
3. FOR SCHEMATIC SEE M.I.S.-1181

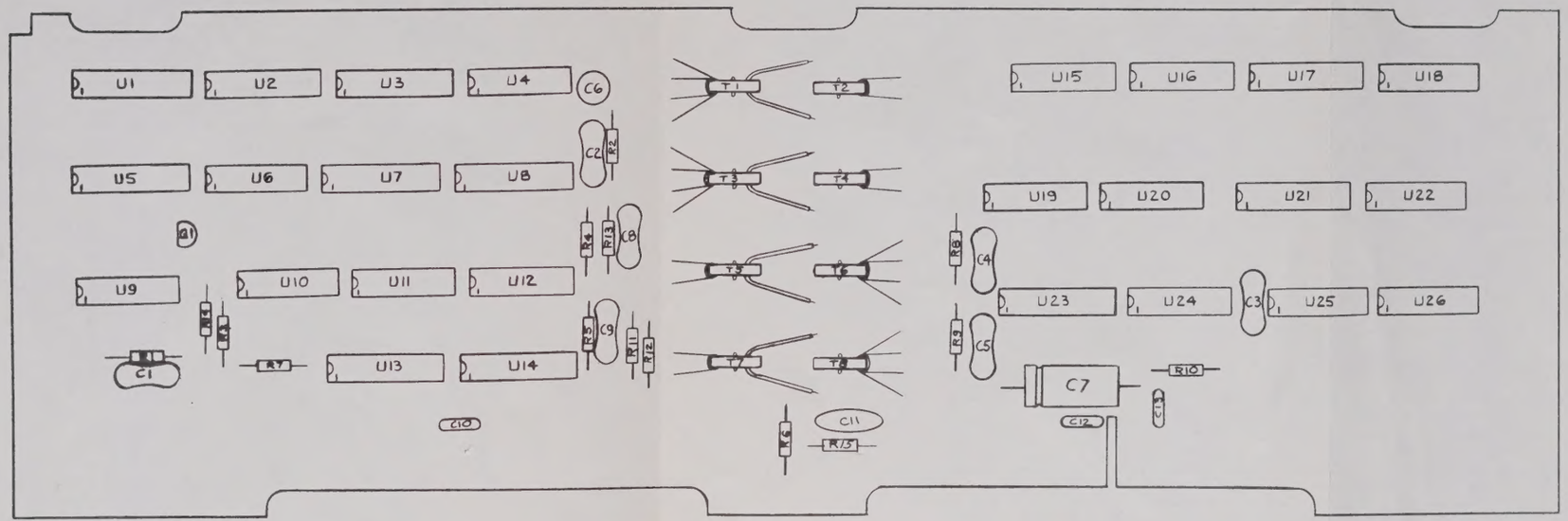

Figure 608-2. Isolator Assembly (M.I.S.-1781)